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AUTHOR	Lewis, Catherine
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ABSTRACT

This paper introduces "lesson study" as used in Japan to improve instruction. Lesson study is the process of planning, conducting, and discussing the research lesson for teachers to study. Four features are identified as essential to Japanese lesson study: (1) a shared long-term goal for teachers; (2) important lesson content; (3) careful study of students; and (4) live observations of lessons. Teachers learn from lesson study and research lessons because of the opportunity to think carefully about goals of the particular content area , unit, and lesson and about long-term goals for students. Research lessons give teachers a change to learn from other teachers, and they offer a way to deepen knowledge of subject matter. Studying research lessons helps a teacher develop instructional expertise and build the capacity for collegial learning. They allow the teacher to develop "the eyes to see students." Several features of the Japanese educational landscape support lesson study, including a shared and frugal curriculum, established collaboration, a belief in improving teaching through collective effort, and the practice of critical self-reflection. Japanese teachers face a certain stability in educational policy and tend to focus their instructional improvement time on instruction as they maintain a focus on the whole child. Some of the barriers facing lesson study in the United States are described. (Contains 48 references and 12 endnotes.) (SLD)

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Does Lesson Study Have a Future in the United States?"

Catherine Lewis

Catherine Lewis received her Ph.D. in developmental psychology from Stanford University in 1979, and is a senior research scientist in the Education Department at Mills College in Oakland, CA. Fluent in Japanese, she is the author of numerous publications on science learning, school reform, and students' social and ethical development. Her book *Educating Hearts and Minds: Reflections on Japanese Preschool and Elementary Education* (Cambrige Univ. Press) was named an outstanding academic book of 1995. She carrently directs an NSF-funded study of lesson study (www. lessonresearch.net) and can be reached at clewis@mills.edu.

Introduction

When I lived in Japan during 1967, I learned to love sushi. At that time, there were just a few sushi restaurants in the US, patronized almost exclusively by Japanese. I would have confidently bet my meager student income that sushi would never become popular in America. Yet today many Americans eat sushi; there are sushi restaurants throughout the United States, and even Homer Simpson, star of the popular animated TV show, devours raw fish. Who could have predicted that Americans would learn to like such a quintessentially Japanese food?

Now let's make an unlikely segue from sushi to research lessons (*kenkyuu jugyou*). When I first began to observe research lessons in 1993, I immediately sensed their worth and interest (just as I immediately recognized the delights of fresh sea urchin.) But I imagined that research lessons were just too exotic to import to the US - based as they are in a centralized educational system, shared curriculum, and tradition of collaboration and self-criticism (*hansei*). But since 1999, there has been a sudden upsurge of interest in research lessons among Americans. Hardly a week goes by that I don't receive an email from an American teacher who wants to try research lessons. Is it possible that research lessons will follow the same storyline as sushi?

My own study of research lessons c me about in an odd way. In 1993, I was sitting in Japanese elementary classrooms for months on end, finishing up my book *Educating Hearts and Minds: Reflections on Japanese Preschool and Elementary Education* (1995), which focuses on students' social development and attachment to school, and particularly on the classroom practices that build Japanese students' basic motivation. Although my research focus had nothing to do with science instruction, I found that I was learning much science,

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without any intent to do so! Suddenly, I was seeing levers and pendulums everywhere. Students' hands-on activities and lively debates about pendulums, levers, boiling water, and so many other topics caused me to notice much science in daily life. As this happened, I was effectively learning science during all my waking hours, rather than just during the school hours (Linn, Lewis, Tsuchida & Songer, 2000; Linn & Muilenberg, 1996).

When I mentioned to Japanese teachers how much I was learning from their science teaching methods, they were surprised. "Didn't our science-teaching techniques come from the US?" asked many Japanese teachers. Indeed, many techniques may have come from US model programs, but they have spread much more broadly in Japan (Lewis & Tsuchida, 1997). When asked to compare current instruction with his own science education as an elementary student, an assistant principal and 25-year veteran of Japanese elementary teaching made clear that the changes in science have been part of larger changes in pedagogy:

> The changes that have occurred since I was a child are changes in the whole elementary system, not just in science: increasing students' autonomy, emphasizing "learning how to learn," taking initiative to learn rather than just memorizing what one is told. These are the changes that have shaped not just science but other subjects as well in the 25 years that I've been teaching.

When I started out to understand how Japanese educators made the shift from "teaching as telling" to "teaching for understanding" in elementary science, many colleagues on both sides of the ocean said there was nothing to study. As one put it, "Japan has a centralized education system; you just tell teachers to change and they change." But much research in US. classrooms suggests that it is difficult to shift from lecturing to fostering active problem-solving-- for example, many teachers "domesticate" new approaches, shaving off important innovative features such as discussion in order to fit a more familiar instructional model (Cohen & Ball, 1990; Olson, 1981).

When I asked Japanese teachers what had influenced their own science teaching, the answer I heard again and again was "kenkyuu jugyou" — research lessons. From 1996-2000, I observed research lessons at approximately 40 schools in various regions of Japan (including many ordinary public schools in both low-income and middle-income neighborhoods, and six national public schools), and I conducted approximately 75 interviews with Japanese elementary classroom teachers and administrators. The research lessons included both within-school lessons (*kounai kenkyuu jugyou*) and public lessons (*koukai kenkyuu jugyou*), and many were videotaped for analysis. I speak and read Japanese, so the interviews were conducted in Japanese.[2)]

Working with colleague Ineko Tsuchida, I published several articles about research lessons (Lewis & Tsuchida, 1997, 1998a), which were read mainly by specialists in Japanese education and educational researchers. But the situation changed dramatically in 1999 with publication of *The Teaching Gap*

(Stigler & Hiebert, 1999), which reports the Third International Mathematics and Science Study (TIMSS) video study of eighth-grade mathematics lessons in Japan, the US, and Germany. *The Teaching Gap* includes a chapter on "lesson study" (*jugyou kenkyuu*), based on the dissertation of Makoto Yoshida (1999). *The Teaching Gap* urges that lesson study be tried in the United States:

> Our goal is simply to convince the reader that something like lesson study deserves to be tested seriously in the United States. It is our hypothesis that if our educational system can find a way to use lesson study for building professional knowledge of teaching, teaching and learning will improve (Stigler & Hiebert, 1999).[3]

The Teaching Gap sparked interest in lesson study among US teachers, researchers and educational policymakers. For example, during 2000-2001, lesson study has been the focus of several state, national and international conferences of classroom educators; has attracted more than 400 educators from across the United States to several lesson study open-houses; has been cited by several high-profile US policy reports; and has had a special journal issue devoted to it (Coeyman, 2000; Council for Basic Education, 2000; Germain-McCarthy, 2001; Research for Better Schools, 2000; Stepanek, 2001; Takahashi, 2000).

One significant early example of lesson study has already been built in the United States, at a public school (pre-kindergarten through grade 8) serving a high-poverty neighborhood in Paterson, New Jersey (Wang-Iverson, Liptak, & Jackson, 2000; Yoshida, 2001). With support from researchers Makoto Yoshida and Clea Fernandez of Teachers College, teachers at Paterson Public School Number Two worked hand-in-hand with teachers from the Greenwich Japanese School to build lesson study.[4] The first US public research lessons were held at School Two in February, 2000, attracting co-sponsorship from the state mathematics teaching organization.

Lesson study's reach even to the general American public is illustrated by the letter written by a local citizen to a Maryland newspaper, urging that the local school district adopt Japanese lesson study rather than "changes imposed 'from the top down'" (Hilger, 2000). The local education columnist answering the letter wrote of lesson study:

> This practice is in stark contrast to American classrooms where each teacher plans and teaches in almost complete isolation. When a brilliant American teacher retires, almost all the lesson plans and practices that he or she developed also retire. When a brilliant Japanese teacher retires, he or she has left a legacy to be enhanced by future teachers (Chenoweth, 2000).

In the United States right now, interest in lesson study is substantial. Yet for anyone who has studied the history of US educational reform, the current interest in lesson study evokes worrisome memories of other once-promising innovations that were superficially understood, hastily implemented, and consequently pronounced ineffective (cf. Fullan & Stiegelbauer, 1991;

Sarason, 1982). Will lesson study suffer a similar fate in the US?

For lesson study to have a chance of deep implementation in the US, I believe that American educators need to find the answers to the following questions:

- What are the essential features of lesson study that must be honored when lesson study is conducted in the US (and what are the non-essential features that can be changed?);
- How do educators improve instruction through lesson study?
- What supports will be needed for lesson study in the US, given its educational system and culture?

The remainder of this essay proposes tentative answers to these questions, with the goal of provoking dialogue between US and Japanese educators and educational researchers about the essential features of lesson study and the supports needed for it.

What are the essential features of lesson study?

Often, an educational innovation loses effectiveness when implementers emphasize certain obvious features without fully understanding other essential features - for example, implementing hands-on math activities without recognizing the kind of mathematical discourse and thinking that the hands-on activities are designed to promote (Cohen & Ball, 1990; Spillane. 2000). From observation of lesson study in diverse Japanese schools, I believe that the following four features are universal, or nearly so, and central to Japanese lesson study.

1. A Shared Long-term Goal

Lesson study starts when teachers agree upon a shared goal for improvement, usually called a "research focus," "research theme," or "important aim."[5] Japanese teachers usually choose a broad goal that is compelling to teachers from many grade levels and many points of view, as the following lesson study goals from Japanese elementary schools illustrate:

- To develop instruction that ensures students' basic academic abilities, fosters their individuality, and meets their individual needs;
- For students to take pleasure in friendships and learning;
- For our instruction to be such that students learn eagerly.[6]

Even when Japanese teachers focus their goals on a single subject area (such as science or mathematics), they often have broad, long-term goals such as for "students to learn science with desire" or "love nature" or "become problem-solvers."

US teachers are often surprised by the broad, long-term goals of Japanese lesson study. These goals sharply contrast with the advice often given US teachers - to focus on short-term, concrete, measurable outcomes. In the examples of lesson study that are emerging in the US, it is sometimes the case that:

- The lesson study goal focuses only on academic outcomes;
- The lesson study goal is chosen by the lesson study leaders, rather than

by the participating teachers;
- The lesson study goal is to achieve a particular test outcome (for example, to improve scientific writing scores on a state assessment).

Are these healthy adaptations of Japanese lesson study to the US situation, or problematic ones?

2. Important Lesson Content

Although lesson study focuses on broad, long-term goals like those just listed, it also focuses on learning of a particular content area, either an "academic" content area such as mathematics or language arts or, less frequently, a "non-academic" area such as art, music, class meetings, and school-wide activities. When choosing the subject for lesson study, Japanese teachers may, for example:

- Target a weakness in student learning;
- Choose a subject teachers find difficult to teach;
- Choose a subject that has changed recently-for example, a subject in which new content, technology, or teaching approaches have been advocated;
- Concentrate on Japanese and mathematics in alternate years, since these subjects account for much instructional time and can be fundamental to progress in other areas.[1]

In the US, most lesson study to date has focused on mathematics, with some attention to science and language arts. Given that lesson study was widely publicized by *The Learning Gap*, a book devoted to mathematics instruction, it is not surprising that most lesson study in the US targets mathematics. Distant runners-up are language arts (the other heavily-tested subject area) and science (many mathematics teachers also teach science).

3. Careful Study of Students

The ultimate focus of lesson study in Japan seems to be *student learning and development*. Japanese teachers gather evidence on students' learning, engagement, and treatment of one another-for example, how they worked in small groups, whether their ideas about electricity changed over the course of the lesson, whether they showed interest and motivation. While Japanese teachers often gather evidence on their own actions as well (for example, all their questions to students, how they used the blackboard, how many students they called on), such evidence on teacher behavior seems to be of interest primarily because of its links to student learning and engagement.

While Japanese lesson study focuses on student learning and development, in the US there is a long tradition of classroom observation focused on the teacher's behavior. For example, teacher behavior checklists (often used during the observations for tenure decisions) assess teacher effectiveness through items like "teacher uses specific praise." Stigler and Hiebert (1999) point out the danger of letting specific teacher behavior, such as use of cooperative groups, technology, or manipulatives, become ends in themselves:

> Reform documents that focus teachers' attention on features of "good teaching" in the absence of supporting contexts might actually divert attention away from the more important goals of student learning. They may inadvertently cause teachers to substitute the means for the ends - to define success in terms of specific features or activities instead of long-term improvements in learning (Stigler & Hiebert, 1999, p.107-108).

Observation in US classrooms is often associated with evaluation of teachers, but less often with broad study of the student experience.

4. Live Observation of Lessons

Live research lessons are the heart of lesson study; much planing and preparation leads up to a research lesson and Japanese teachers sometimes travel hundreds of miles to attend research lessons. Why is so much importance assigned to live observation of lessons-rather than, say, to observation of videotaped lessons or review of lesson plans?

Student learning and development cannot be assessed by looking at a lesson plan, or even by looking at most videotapes of lessons. To say "It was a good lesson but the students didn't get it" is like saying "The operation was successful but the patient died." When teachers gather to watch a research lesson, they collect kinds of data that cannot be gathered from students' tests, written work, or sometimes even from videotapes: for example, evidence on students' engagement, persistence, emotional reactions, quality of discussion within small-groups, *tsubuyaki* (under-breath exclamations), inclusion of groupmates, degree of interest in the task, and so forth. In other words, during the research lesson teachers observe much more than the "lesson" itself: They observe the students' whole demeanor toward learning and toward one another. It is impossible to identify a "good lesson" without actual observation, for a single lesson plan may result in very different lessons, dependent on students, teacher, and many subtleties of the interactions between them (Lewis, 2002).

Videotape, written cases, lesson plans, photographs, and student work are all used extensively by Japanese teachers to learn about other teachers' lessons. Yet these artifacts seem to be regarded as a supplement, not a substitute, for live observation of real lessons. In contrast, many US educators are working to develop electronic or videotape-based lesson study, in order to make lesson study more convenient for dispersed teachers and more flexible in timing.

To recap, lesson study as it is practiced in Japan seems to have four central characteristics:

1. A shared long-term goal
2. Important subject matter
3. Study of students
4. Shared observation of live lessons

While these four characteristics seem to be universal or nearly so in Japan, are they essential? Or could they be altered without compromising the effectiveness of lesson study in the US? Let's keep this question in mind as we

explore the next question.

How do educators improve instruction through lesson study?

How do educators learn during lesson study, and what key activities lead to improvement of instruction? In interviews, I asked Japanese educators what they had learned from lesson study, what constitutes a successful research lesson (kenkyuu jugyou) and research lesson discussion (kyougikai), and how Japanese education would be different without research lessons. Their answers provide an initial guiding framework for US educators who want to think about the elements that make lesson study effective - at least in Japan. In the view of Japanese teachers, effective lesson study provides opportunities to do the following.

1. Think Carefully about the Goals of a Particular Content Area, Unit, and Lesson

> A Japanese teacher said:
> Research lessons are very meaningful for teachers because...they think hard and in a fundamental way about several critical issues, for example, "What is the basic goal of this lesson in this textbook?" "How does this particular lesson relate to my students' learning and progress in this school year?" "How does this lesson relate to other curriculum areas?" Thus, it is very beneficial to teachers. Unless they think about all these things, teachers can't conduct research lessons. That is the purpose or significance of research lessons. Even if teachers do not think hard about the lessons they teach daily from the textbook, they must really rethink the fundamental issues for research lessons.

American teachers also notice the opportunity provided by lesson study to think deeply about why they are teaching particular content. As one US teacher commented on her lesson study experience, "Instead of thinking 'what will I cover in this lesson?' now I think 'what do I want students to learn from this lesson?"

2. Think Deeply About Long-term Goals for Students

As noted above, Japanese lesson study often focuses on broad, long-term goals for students. A few American eyebrows always go up when I read the lesson study focus from Komae School Number Seven: "For students to value friendship, develop their own perspectives and ways of thinking, and enjoy science." The skeptical faces seem to say, "What on earth do friendships have to do with learning science anyway? Let's skip the fuzzy stuff." US educators are often told that it is important to have concrete, measurable goals.

But the focus on broad, long-term goals may provide a motivating, unifying structure to lesson study, bringing together educators around goals they all hold dear. For US educators who have tried lesson study, the opportunity to focus on long-term goals may feel like the essential missing piece of instructional improvement. As one US teacher commented: "Lesson study focuses on the long-term; usually when you're teaching you don't have time to think

beyond the immediate skills you want students to learn that day." Another US teacher said:

> A lot of [American] schools develop mission statements, but we don't do anything with them. The mission statements get put in a drawer and then teachers become cynical because the mission statements don't go anywhere. Lesson study gives guts to a mission statement -- makes it real, and brings it to life.

Building lesson study around long-term goals may also enable Japanese teachers to keep in mind the qualities such as love of learning and capacity to get along with others that may underlie student learning but can be forgotten in the daily grind of school. Lesson study's long-term goals recognize that students' learning is greatly shaped by their motivation, sense of support from classmates, and other habits of heart and mind.

Finally, the long-term focus of lesson study may support teachers in finding instructional approaches that foster both academic and social development. When teachers look at instruction simultaneously through the lenses of promoting friendships and academic learning, it is likely they will attend to both, rather than teaching in ways that inadvertently undermine one or the other. The history of U.S. education has been plagued by pendulum swings between "self-esteem," on the one hand, and academic rigor on the other – a cycle that can be escaped only if schools learn to promote both goals simultaneously (Lewis, Schaps, & Watson, 1995). Long-term goals that emphasize both social and academic development may help guard against the "quick fixes" that focus on test performance at the expense of students' motivation, commitment to schooling, and experience of school as a supportive environment.

3. Study the Best Available Lessons

Several Japanese teachers mentioned that research lessons provide an opportunity to learn how other teachers (both within the school and at other schools) teach particular subject matter. During the lesson planning shown in the videotape "Can You Lift 100 Kilograms?" (Lewis, 2000), for example, Japanese teachers compare several different plans for teaching the levers unit. These plans come from textbooks, teachers' own prior instruction, and research lessons that members of the group have observed or found in books written by other teachers. US teachers are not likely to have access to the same wide range of lesson plans, videotaped lessons, and reports of research lessons, although some US groups are seeking to use technology and other innovative means to develop them (for example, see www.lessonlab.com).

4. Learn Subject Matter

Japanese teachers also mentioned that research lessons provide a good way to deepen one's knowledge of subject matter-particularly for topics newly added to the curriculum. For example, when solar energy was added to the Japanese science curriculum about a decade ago, teachers in many schools chose to focus research lessons on it. They debated among themselves what

knowledge and attitudes it was important for students to develop related to solar energy. One teacher commented during the discussion following a solar energy research lesson:

> I haven't taught fourth graders for awhile, so I have no idea how and why solar batteries were added to the curriculum. I'm only guessing that including solar batteries reflects adults' hope that children will become the next generation of scientists who will become interested in solar energy and thereby help Japan. Science education specialists might be concerned about children using the proper vocabulary or setting up certain experimental conditions, but if the goal of including solar batteries in the curriculum is to get children interested in the fact that electric current can be changed by light, then Mr. Hori's lesson fulfilled that. So I'd really like to know the reason why solar batteries were included as a new curriculum material for fourth graders.

Teachers had the benefit of colleagues' ideas as they sought to figure out what it was important for students to understand about the new science content. The school invited scientists and science educators to watch the lessons, so they could question them about the new science content. One teacher asked:

> I want to know whether the three conditions the children described - "to put the battery closer to the light source," "to make the light stronger," and "to gather the light" – would all be considered the same thing by scientists. They don't seem the same to me. But I want to ask the teachers who know science whether scientists would regard them as the same thing.

In other words, the research lesson provided an opportunity for these teachers to establish what knowledge was important, discover gaps in their own knowledge, and acquire the needed information. Subject matter specialists - such as university faculty or classroom teachers knowledgeable about the subject area - also often participate in lesson study in Japan (Watanabe, 2002, Yoshida, 1999).

US teachers aiso note the impact of lesson study in helping them discover and remedy gaps in their own content knowledge. A teacher from Paterson School Number Two comments on lesson study's role in building subject-matter knowledge:

> We've gotten into a lot of discussions from [reading] Liping Ma[6] and [thinking about] the knowledge piece - what students really need to take with them and why they are doing this... And we are becoming more educated... The seventh grade teachers...throw stuff back at us. We are relearning the math that we learned when we were in school that some of us have forgotten. So I think our knowledge has increased as we have been doing this.

So, while lesson study does not ensure access to content-knowledge, it may help educators notice gaps in their own understanding, and provide a meaningful, motivating context for seeking a deeper understanding; it also provides the opportunity for teachers to learn from more knowledgeable peers. Lesson study may follow the pattern Liping Ma has observed in Chinese lesson

development, "American educators assume that you need to learn content knowledge before you can plan lessons. Chinese teachers think you learn content knowledge by planning lessons."[1]

5. Develop Instructional Expertise

Lesson study also builds understanding of instruction - of how lessons can be honed and modified to better reach children. This expertise seems to be built both during the lesson planning, as teachers anticipate student responses and hone questions they will ask, and also as a result of teaching the lesson, when teachers reflect on the lesson's activities, visual aids, worksheets, key questions, and so forth. For example, teachers at School Two described how they repeatedly revised a lesson's visual aids so that they would be exciting to students, clear, and provide just enough information to solve the problem using multiplication, but not enough to solve it via simple addition.

Teachers studied by Makoto Yoshida (1999) developed a list of characteristics of a good manipulative, after discovering that the manipulatives commonly used to teach subtraction did not allow them to reconstruct students' thinking. The teachers of "Can You Lift 100 Kilograms?" discovered that students gave very different responses when asked to look at an illustration of the problem on paper than when shown the actual 220-pound sack. In lesson study, teachers think carefully about the questions, activities, and approaches to be used in the lesson. By observing students, teachers see how a particular question, activity, or approach animates or derails learning.

In interviews, Japanese teachers mentioned both specific feedback they had gained on their own instruction, and a number of specific teaching techniques learned from watching others' research lessons:

> As a brand new teacher, my colleagues who saw my research lesson told me I talked too fast. They were right. My students were having a hard time keeping up with what I said, and I didn't even know it!

> Something I learned from seeing a research lesson is finding out how teachers deal with certain common problems in the classroom, such as how to get a debate going when there's just one point of view held by most of the children in the class. For example, if there's just one child holding the "B" point of view, and the rest of the class holds the "A" point of view, the child holding "B" may feel bad if you stimulate a debate between views A and B. The "B" child may feel alone, and want to switch to be with the majority. That's a kind of torture for children. One thing many teachers will do in that situation is to take the "B" point of view themselves. But then the teacher is talking alot, instead of the students. What I learned is that you can ask children how sure they are of the viewpoint they espouse. Are they 100% sure, or 80% sure, or half sure? Then you can ask what their doubts are about the idea, and have a debate between people who do and don't have doubts of a certain kind....That's a technique that I learned from research lessons that I apply in my classroom lessons when there's not enough difference of opinion to sustain a debate.

> Another example of something I learned from research lessons is to use magnets

> with children's names on the blackboard. For example, you can...use them to keep track of how children's opinions about something changed over the course of a lesson or unit. Or you can put the name-magnets next to ideas, and children can look at them and be conscious of their own ideas.

The data gathered by one's colleagues during a research lesson provide an external reference point on one's practice. In one research lesson, an observing teacher told her colleague: "Only 47% of the children spoke up today during your science lesson. To increase participation, you might have quickly polled all students, especially since you already had their names on magnets."

In addition to seeing research lessons as a source of feedback and of new techniques, teachers described influence of research lessons on their philosophy of teaching:

> I had always seen education as teachers giving knowledge to children, as a top-down process. Through my work with the elementary science research group, I came to see education not as giving knowledge to children but as giving them opportunities to build their own knowledge. Initially, that was not what I believed. Even when I saw it in practice, I couldn't believe in it at first. When I first saw lessons in which children were building their own knowledge, I thought 'Is this kind of instruction really OK? It takes so much time' But then I began to realize that if children don't experience something, they don't understand it. They can memorize it but when the time comes to use it, they can't.

6. Build Capacity for Collegial Leaning

In addition to the specific techniques and approaches learned during lesson study, Japanese teachers note the benefits of creating a learning environment among teachers in the school:

> What's a successful research lesson? It's not so much what happens in the research lesson itself that makes it successful or unsuccessful. It is what you learned working with your colleagues on the way there.

A Japanese teacher underlines the essential role of collaboration in the improvement of instruction:

> Unless you improve your own skills, you can't do a good lesson even with a good lesson plan or good textbooks. .... If you isolate yourself and do whatever you wish to do, I don't think you can ever conduct good lessons.

In addition to the specific techniques picked up during lessons, Japanese teachers mention the benefits of deepening the capacity to learn from colleagues. As one Japanese teacher said after a research lesson was over:

> The research lesson is not over yet; it's not a one-time lesson, but gives me a chance to continue consulting with other teachers. Other teachers can provide me with concrete suggestions and advice because they have seen at least one lesson I conducted. We teachers can better connect with each other in this way.

Although US educational researcher Richard Elmore notes that "isolation is the enemy of improvement," few US teachers have regular opportunities to

work with other teachers on the improvement of classroom instruction; While the average Japanese teacher sees about 10 research lessons a year (Yoshida, 1999), only 5-13% of US teachers even visit each other's classrooms "often" or "very often" (Center for the Future of Teaching and Learning, 1998, p. 9).

Some US teachers involved in lesson study already comment on the learning network it has created for them. One commented, "It used to be that if I was having a problem in my classroom, I would go out and buy a book and read it. And if that didn't work I would go out and buy another book. Now I realize that I can ask people within my school." The same US teacher commented that, after being involved in lesson study, she had developed a sense of connection that led her to see colleagues' students as "our" students, not "your" students.

7. To Develop "The Eyes to See Students"

Japanese teachers often mentioned as a major benefit of lesson study "the eyes to see children (kodomo wo miru me)." During research lessons, teachers scour the classroom for evidence of student learning, motivation, and behavior – everything from how children's thinking about levers changed over the lesson, to whether the quietist children spoke up, to whether children's "eyes were shining" as they investigated pendulums. As teachers carefully observe students' learning, engagement, and behavior during a research lesson, they have the chance to think more deeply about students than is usually possible in the hubbub of daily classroom life. Teachers see instruction through the eyes of the students. Teachers also improve their observational skills. For example, a teacher may realize that she tends to miss students' non-verbal communication, compared with what fellow teachers notice.

In summary, interviews conducted to date suggest that seven key experiences during lesson study enable Japanese teachers to improve instruction. These are opportunities to:

1. Think Carefully about the Goals of a Particular Content Area, Unit, and Lesson
2. Think Deeply About Long-term Goals for Students
3. Study the Best Available Lessons
4. Learn Subject Matter
5. Develop Instructional Knowledge
6. Build Capacity for Collegial Learning
7. Develop "The Eyes to See Students"

The tentative lists of key experiences and essential qualities of lesson study are laid out in the hopes that Japanese teachers and researchers will question and debate them. What is missing? What is non-essential? The list can also provide a framework or reflection guide for US educators who want to build or assess a lesson study effort.

Lesson Study: What Are the Supporting Conditions?

Several features of the Japanese educational landscape seem to support

lesson study.

1. A shared, frugal curriculum

By U.S. and world standards, the Japanese curriculum is very spare. The TIMSS (Third International Mathematics and Science Study) documents, for example, that Japanese eighth grade science textbooks cover just eight topics, compared to an average of more than 65 for U.S. eighth grade textbooks (Schmidt et al, 1997). Since Japanese teachers have 12-14 class periods to help students master just three items related to levers (Monbusho, 1991, p.64), teachers can devote time to studying the most effective ways to present it -- rather than to wading through massive textbooks to figure out what's really important to teach (Lewis & Tsuchida, 1997, 1998a, Lewis et al., 2002; Tsuchida and Lewis, 2002; Schmidt,McKnight & Raizen, 1997). In contrast, US teachers might have just one or a small number of periods to devote to levers.

Japanese teachers typically teach the same class for two years, and over time rotate through all grade levels. So the content taught to other grade levels is likely to be content relevant to all teachers, because they have taught it or will teach it in the future. In contrast, many US teachers teach a single grade level repeatedly, and even teachers within a school may not share a curriculum. Along with the fact that US teachers cannot teach everything in their broad curriculum, these conditions reduce the likelihood that US teachers will teach the same content.

2. Established collaboration

The first time I asked a Japanese principal how to build a good climate for lesson study at a school, he mysteriously answered "volleying a beachball." It was the kind of answer that eventually became very familiar; teachers developed good working relationships in many ways-practicing for a game of beachball volleyball against the PTA, planning the teachers' skit for the school festival, or planning the 30 days a year of school-wide activities such as hiking, school trips, sports day, and so forth (Lewis, 1995). Japanese elementary teachers routinely consult each other on lessons in the teachers' room (where teachers' desks are located, arranged by grade level), and they routinely take care of each other's classes, since substitutes are not hired for short-term absences (Bjork, 2000; Sato, 1996; Sato & McLaughlin, 1992; Rohlen & LeTendre, 1996; Shimahara & Sakai, 1995).

Collaboration in Japanese schools may also be enhanced by the fact that teachers take responsibility for attending outside meetings of a subject area, and for acting as a resource to other teachers within the school for that subject. Hence, each teacher has responsibility for keeping colleagues up-to-date in a particular subject area.

Comments of two Japanese teachers also suggest that cultural attitudes toward borrowing may support routine collaboration:

> Even if you copy someone else or are copied by someone else, I don't think anything can be absolutely the same. So, I think it is all right to copy others.
>
> If you shoot for originality too early in your development as a teacher, you're likely to fail. Initially, you must take a lot from others. But ultimately, to move to a higher level of teaching, your lesson must become your own original thing, not simply imitation of others. But it's through imitating others' lessons you create your own authentic way of teaching.

It is *not* the case (despite accounts to the contrary) that Japanese elementary teachers have more time for collaboration during the schoolday than their US counterparts; daily time with students is comparable or longer in Japan (see Lewis, 1995).

3. A Belief that Teaching Can Be Improved Through Collective Effort

I was once stopped in my tracks by an American school board member who said "Don't you think that good teachers are born, not made?" I don't know whether this is a common point of view in the US, but Japanese educators certainly act as if good teaching is created through continuous effort (just as they attribute student achievement to effort; Stevenson & Stigler, 1992).

A teacher quoted earlier points up another belief about teaching: that collective effort is needed to improve it – that you cannot ever conduct good lessons if you "isolate yourself and do whatever you wish to do." This recalls the distinction made by Westheimer (1998) between "collective" and "liberal" teacher communities within U.S. schools. In the collective teacher community, teachers believe they need to forge a common vision of good practice; in the liberal community, vision and practice are ultimately matters of individual conscience. What elements of educational vision and practice can productively be left to individual teachers, and what need to be approached coherently by an entire school? For example, is it fair to ask students to move back and forth during the elementary years from classrooms where mathematics is taught as inquiry to ones where it is taught as procedures to be memorized, requiring in each case dramatically different skills, learning strategies, habits of mind, and personal qualities? The downside of individual teacher autonomy is potential lack of coherence in children's experience.

4. Self-critical Reflection

Within Japanese schools and perhaps within Japanese culture more widely, *hansei* – self-critical reflection – is emphasized and esteemed (Rohlen, 1976; see also Lewis, 1995). Both teachers and students set goals for self-improvement in a "quest for character improvement [that] is close to being a national religion"(Rohlen, 1976, p.128). De-emphasis of external evaluations (merit reviews, checklist evaluations, etc.) of teachers may create safety to reveal one's weaknesses (Bjork, 2000). Self-critique may have a decidedly different emotional meaning when it is established and valued as it seems to be in Japan; identifying one's shortcomings and soliciting and gracefully accepting

criticism may be ways of showing competence, not failures to be avoided. Nor is critique typically focused on a single individual; collaborative planning of research lessons means that criticism is generally shared with several colleagues.

5. Stability of Educational Policy.

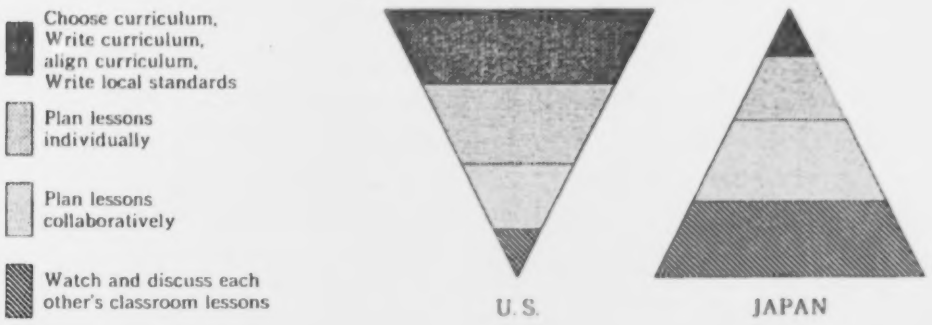
Although some Japanese educators complain that Japanese education is slow to change (Shimahara & Sakai, 1995; Horio & Platzer, 1988), general stability may enable educators to concentrate on policy changes that do occur. The comments of a Ministry of Education official suggest a surprisingly long timetable for change:

> We change the *Course of Study* about every ten years. But the truth is that ten years is too short a time to change classroom education. If we greatly changed the *Course of Study* every ten years, teachers would be turning their heads this way and that so often that their necks would break. So we make major changes in the *Course of Study* only every twenty years or so, and in between it's just fine tuning.

In contrast, US educators are often expected to implement programs and show results within just a year or two.

6. Instructional Improvement Time Focused on Instruction

Figure 1 is a schematic that suggests how Japanese and U.S. teachers spend their instructional improvement time. Japanese teachers spend relatively little time at the top of the pyramid, in developing or aligning curriculum, or translating national standards into local practice. They have a frugal national *Course of Study* and a number of nationally approved textbooks from which to choose. Although Japanese teachers as a whole spend little time developing or aligning curriculum, it's important to note that elementary textbooks are written by elementary teachers, based on their actual lessons. Because Japanese teachers start with texts that are teacher-written and lesson-based, they can afford to spend considerable time at the bottom of the pyramid, planning, observing, discussing and refining actual classroom lessons.


Choose curriculum, Write curriculum, align curriculum, Write local standards
Plan lessons individually
Plan lessons collaboratively
Watch and discuss each other's classroom lessons
U.S.
JAPAN

Teacher's Activities to Improve Instruction

In contrast, many U.S. teachers spend a great deal of time selecting and adapting curricula, articulating what will be taught at each grade level, aligning curricula with state or district standards, and finding or writing lessons to fill the resulting holes. To take the example of levers, all five Japanese fifth grade textbooks devote about 1/12th of the entire fifth-grade textbook to the study of levers. While there are 24 illustrations and 23 photographs in the average 11-page Japanese unit on levers (most of them illustrating the activities children will do), there are just 22 sentences describing levers, in contrast to 131 sentences in US texts (Tsuchida & Lewis, 2002). American elementary science textbooks are designed for students to read about science; Japanese textbooks are designed for students to do science (Tsuchida & Lewis, 2002). So US teachers must first decide whether to teach levers – one of many topics related to simple machines that appear at multiple grade levels. Then, within the levers unit, they must deal with about six times as much text. In other words, several factors conspire to make American teachers invest considerable time at the top of this pyramid -- decentralized decision-making, multiple levels of policies and requirements, and perhaps most of all, the fact that available curricula are jam-packed with information typically meant to be read, not done, whereas the Japanese textbooks are lesson-based, containing fewer lessons than the number of periods actually allocated for the subject. Hence the upside-down U.S. triangle stands precariously on its tip, without a large enough basis of classroom practice, observation, and discussion to support it in a stable fashion.

7. Focus on the Whole Child

The final support for lesson study that I would like to mention is the focus on the whole child in Japanese elementary schools. Japanese elementary teachers see their job as "raising children" (*kodomo wo sodateru*) – as promoting children's social, ethical, emotional, aesthetic, physical, and intellectual development. As a Japanese elementary teacher summed it up, "My most important job is to create happy memories" (Lewis, 1995). How Japanese teachers do this – through family-like small groups, use of many unity-building activities, 30 days a year devoted to school-wide festivals, emphasis on students' own personal goal-setting and reflection rather than adult-imposed rules and rewards – is beyond the scope of this paper (see Lewis, 1995), but the fact of concern with the whole child may be an important instructional support. For example, Japanese science lessons depend for their success upon a particular social, motivational, and disciplinary infrastructure that is carefully built up during the years of elementary schooling (Linn, Lewis, Tsuchida, & Songer, 2000), and Japanese lessons may not transfer successfully to schools in other countries where students are used to extrinsic rewards, short-answer questions, and minimal responsibility for classroom management.

Analogously, the emphasis on the whole child in Japanese elementary schools may provide essential support for lesson study. Komae's goal that

students value friendships at the same time that they develop individual ways of thinking and perspectives is typical of lesson study goals in its focus on the full development of the student. An interwoven emphasis on social and intellectual development may make lesson study deeply compelling to teachers, and heighten their willingness to collaborate. Compare two questions: "How should we teach mathematics?;" and "What are the biggest gaps between our students' current development and our ideals for them?" While many teachers are gripped by the question of how to teach mathematics, nearly all teachers are likely to see the latter question – what is the gap between who are students are now and who we want them to be – as at the very heart of their work as teachers, and it is not a coincidence that this is the question at the heart of lesson study, a process driven by teachers. Further, the broad nature of lesson study goals means that teachers must truly work together over all the years of a student's elementary school life to achieve them. As Clea Fernandez has noted, if lesson study were only about teaching subtraction with borrowing, it might be possible for a single teacher to improve it; but all teachers must collaborate to move the school toward its ideals for students.[10]

What is the Future of Lesson Study in the U.S.?

On February 28, 2000 I had the privilege to attend what I believe was the first day of public lesson study in a U.S. school, at Paterson School Number Two, in Paterson, New Jersey. It was among the most extraordinary and inspiring days I have ever spent in a school.

During the public lesson study day, four different lessons were taught, and School Number Two teachers, Greenwich Japanese School teachers, and other invited educators went into the classrooms to watch. In one lesson, second-graders were introduced to multiplication with the problem "I bought five Kit-Kat bars, and each one has four pieces. How many pieces do we have? Do we have enough for everyone to have a piece?[11] Students represented and solved the problem using various strategies, and the teacher asked students to share these on the board and explain them. I found myself surprised to hear these young students thoughtfully explain their solution methods and explore the connections among them-for example, why skip-counting by 4's amounts to the same total as adding groups of four. When a second problem was assigned, observers could gauge how students' thinking about multiplication had progressed over the course of the lesson.

I was struck during that lesson and the others I saw that day how much is communicated during a research lesson. Most obvious, of course, is the lesson itself – a very motivating, carefully designed introduction to multiplication that had been planed by four second- and third-grade teachers, tried earlier in another second grade classroom, and refined by the four teachers working together over a period of time. Even more basic is the whole idea of instruction as something that can and should be improved through consultation with colleagues, trial in the classroom and critique. The teachers described how

they revised the lesson's visual aids (large laminated pictures of the fronts of four Kit-Kat bars and the inside of one). They redesigned the visual aids so that students would be clear on the numbers for the math problem – that there were five candy bars and each contained four sections – but would not be encouraged to use simple counting to solve the problem, as they might be if the insides of all five bars were visible. In their explanation of the redesign, the teachers were modeling another hallmark of lesson study – anticipating students' reactions to the lesson and planning for them. Another important element was that observers were able to study students' representation and discussion of the problem, and to see a lesson from the student point of view in a way that is rarely possible in other forms of professional development-even videos or written cases, though these certainly come closer than many forms of professional development. Finally, I was struck by another quality of research lessons – the power of real, live students, deeply engaged in learning math, to renew and inspire adults. For many of us, the most astonishing moment of the lesson came when students postponed eating the Kit-Kat bars because they preferred to solve the second multiplication problem!

Teachers at School Two worked closely with Japanese teachers from the Greenwich Japanese School, so they have had an intense, authentic exposure to Japanese lesson study. School Two provides an "existence proof" that lesson study can thrive in the US, at a school that embraces many conditions common to urban US schools - including very low family incomes, racial and ethnic diversity, and many second language learners.

Most US teachers embarking on lesson study have not had the same opportunity to work with Japanese educators. Many emerging examples of lesson study in the US diverge substantially from lesson study as it is practiced by Japanese. For example, at least one US lesson study group focuses on perfecting and publishing lesson plans, with relatively little emphasis on live observation of lessons. Many groups focus on mathematics without attention to broader issues of student social or personal development. E-mail and video-based lesson study are also emerging in several places, either as ways to bring together rural or dispersed teachers, or simply because of the time flexibility they offer over face-to-face meetings. A number of lesson study groups are emerging among US junior-high and high-school teachers, where teachers may already have a "department" structure that facilitates joint planning and observation.

The tradition of top-down reform in the US means that in at least one US setting, lesson study has been mandated by a school board, rather than initiated by teachers. Another interesting variation in the US is that some teachers have been able to obtain stipends for time outside of school hours spent in lesson study. Research is needed to understand which adaptations are successful and which are not, and I hope many Japanese educational researchers will want to collaborate on this task.

Recent research suggests a number of challenges faced by lesson study in the US, including lack of a shared, frugal curriculum, lack of good lesson

examples on particular topics, the need for guidelines on how to observe, discuss, and revise lessons, and the lack of shared planing and observation time during the paid workday, to name but a few (Fernandez et al., 2002; Perry & Lewis, in preparation).

Preliminary evidence suggests that, at least at some sites, US teachers have found lesson study useful:

> What surprised me is how quickly we found lesson study useful. As a teacher, you find immediate rewards from working on lesson study. It changes how you think and what you do that very day. It's very different from the "sit and take" model of professional development, where you don't see the effects until you apply something in the classroom months later.

> Another US teacher reflects:
> In the past, a lot of us never really thought about two grades down the line and how what we were teaching affects them. And now we really are. We are looking at it from [the point of view of] "This is what they learn in kindergarten. How does it carry through eighth grade?"

A US teacher describes her changed approach to lesson planning as a result of lesson study:

> ... [now] we think a lot more about the motivation for the lesson and making sure that the kids have the prior knowledge that they need before we teach each lesson...Before we did lesson study we really didn't think about what the student responses would be to the questions. When we posed a problem we never really thought about what the kids would come up with. It was... 'Well, we hope they get the right answer and if we don't then we will deal with it.' Now we are really thinking about, 'Well, what if this answer were to come up? How would we deal with it?'

To date, the number of US sites where lesson study is successful (judged by teachers' accounts of its usefulness in improving their instruction) is still very small, and it is likely these sites had important supporting conditions in place for lesson study, including a tradition of collaboration, an interest in teachers' inquiry, a shared curriculum, and administrative support for teacher-led learning (Wang-Iverson et al., Lewis, 2002, Perry & Lewis, in preparation). Again, research is needed to understand the supporting conditions that have enabled lesson study to succeed at some sites.

It is too soon to know whether lesson study will succeed in the US, but the likelihood of success would be increased by the participation of Japanese educators who could help to figure out the essential qualities of lesson study, the key experiences that make it useful to teachers, and the supporting conditions that enable it to be effective. A second essential condition for success will be US lesson study pioneers who see their task as reinvention of lesson study in the US - who recognize that lesson study cannot just be 'borrowed' in toto from an educational system as different as Japan's, but must be thoughtfully adapted to our own very different educational system and culture.

The graveyards of U.S. educational reform are littered with once-promising

innovations that were poorly understood, superficially implemented, and consequently pronounced ineffective. If lesson study is to be any different, it will require a deep understanding of what it is and why it has been useful to Japanese teachers, and how it can be adapted to the very different setting of the US. The example of sushi is a hopeful one. Not only have Americans appreciated its essential character as a fresh, lovely, nutritious food, we have invented some wonderful new varieties – like "California roll" - that have been re-exported to Japan. Perhaps US and Japanese educators and researchers, working together, can build the knowledge base for a lesson study movement in the US that someday contributes vital new re-inventions (such as high school lesson study?) to Japan.[12]

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3) "Lesson Study" (*Jugyou kenkyuu*) is the larger process of planning, conducting, and discussing the research lesson, of which the research lesson is the centerpiece; it is a more familiar term to Americans than "research lesson," and will be used herein.

4) During and prior to the partnership, Dr. Patsy Wang-Iverson of Research for Better Schools also worked closely with teachers at School Two to improve mathematics instruction.

5) (*kenkyuushudai, kenkyuuteema, juutenmokuhyo*).

6) These goals come from Yoshida, 1999 and Lewis & Tsuchida, 1997

7) Based on Yoshida, 1999, as well as my interviews.

8) Ma (1999)

9) Liping Ma, comments at Research for Better Schools conference "Think Globally, Teach Locally," Cherry Hill, New Jersey, April 23, 2001.

10) Clea Fernandez, personal communication, 2000.

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